Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

PPS020-P22 会場:コンベンションホール 時間:5 月 25 日 10:30-13:00

不規則衛星の起源：木星の小惑星一時捕獲における土星の影響
Origin of irregular satellites: the effect of Saturn on the temporary capture of asteroids by Jupiter

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We have investigated the possible origin of the irregular satellites in the asteroid belt. The irregular satellites might not be formed by accretion in a circumplanetary disk, as were the regular satellites. The inclination distribution and large semimajor axes of the irregular satellites tell us that they must have formed elsewhere and later been captured into their current orbits around their host planets. The original places where irregular satellites were formed have not been clarified so far. However, their low albedo (around 0.05) derived from the observations may indicate that they are physically similar to asteroids rather than Kuiper belt objects. Our study has been started on this observational indication.

The process of temporary capture of particles by a giant planet has been investigated by many authors. However, the effect of another planet on the capture process has not been clarified. How effective/ineffective is Saturn in the capture of asteroids by Jupiter? To answer the questions we calculate the orbit of mass-less particles initially distributed around the asteroid belt (2-5AU) under the perturbations by Jupiter and Saturn. Jupiter and Saturn have their current masses and in circular orbits with their current semimajor axes. These two planets have no gravitational interaction between them (so-called restricted circular 4-body problem). During the calculation, we count the number of encounters of the particles within the Hill radii of Jupiter and Saturn as the irregular satellite candidates (hereafter J-, S-candidates).

We find that (1) asteroids can be transported near both Jupiter and Saturn, (2) the number of J-candidates is about three times larger than that of S-candidates, and (3) the existence of Saturn is ineffective in the capture by Jupiter and changes the favored conditions for capture.

On our poster paper, we will show the detailed results and analytical expression of them, and discuss the consistency of the produced candidates by our calculations and the observational results referring to the scenario of the long-term dynamical evolution of the captured objects around planets proposed by several authors so far.

キーワード: 不規則衛星, 準衛星, 小惑星
Keywords: irregular satellites, quasi-satellites, asteroids